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POLAR RESEARCH IN GLACIOLOGY

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Reports were received from 23 of the 88 universities and olleges solicited. Glaciology is a stepchild and, as such, is adopted" by 16 geology departments, as well as 4 combined geology-ography or geology-geophysics departments. Only 1 (Denver) is iven under the auspices of Geography (the common "home" of gla-ology in Europe), and 1 (Purdue) is listed with Civil Engineering.

Viewed in total, glaciology involves: applied seismology, ecipitation and runoff hydrology, climatology of the colder gions, photogrammetric and map representation, firn stratigraphy, formation and metamorphism of ice, and the physical concepts of lid flow and ice crystallography which underlie it all. No nder there is glaciology discussed in 1960 at:

1. The XIX Geographical Congress, Section 3 and Greenland Symposium
2. The XXI Geological Congress, Section 4;
3. The XII International Geophysical Union;

Where is glaciology? If we wish to give that study unity, herence, and concerted effective research, this must be one of r major considerations.

art I. Manpower

1. From the 24 respondents in glaciology, we learn of 39 rofessional persons engaged in glaciological studies (including polar

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ocean floor sediments, some glacial geology, etc). On the average, there are 2½ such experts in each of the 16 departments:

Cal. Tech.
U. Colo.
Columbia
U. Denver
Fla. State
U. Ill.
U. Mich.
U. Missouri
Northwestern
Ohio State
Purdue (2)
South Dakota
Stanford
Washington U.
U. Wisconsin

We know we are missing responses from such places as Dartmouth and Alaska.

2. Some indicate huge potential manpower (Columbia 40-50, Florida 10, Illinois 10), though only 67% of the potential glaciologists seem to be devoted to it now. More properly stated, relatively few geologists, climatologists or physicists have turned to research in this interdisciplinary "fringe" area.

3. A few less graduate students (38) than faculty (39) are devoted to this field. This is only 5% of all graduate students in schools reporting, or 7% of all graduate students where polar glaciology is done. The 13 departments listing such glaciology students average 2½ apiece.

Part II. Facilities

1. Special facilities for glaciology are still very limited. Fourteen of the 24 who responded showed nothing, and undoubtedly all of the 70 who did not respond have nothing. Three list seismic equipment, Rigsby stage, and coring devices; gravimeters, photogrammetric facilities or a cold room are listed by 2 each. Others list special model study facilities (Florida State), hot points, mass spectrometer, and high pressure equipment (Cal. Tech.).

Evidentally none are fully equipped; and only Cal. Tech., Columbia, Michigan, and, possibly, Purdue have significant items. Very likely many items are available at Wisconsin and Alaska and will be available soon at Ohio State.

2. As to library, only Dartmouth has its unexcelled Steffanson Polar Library and Michigan, its Hobbs Collection. Twenty-one say "no separate polar library," but 10 (43%) have good polar collections in a handy departmental library. Although 15 indicate polar books in the general university library, only 7 suggest this is the sole source. Six indicate very small book collections.

3. There is a wide range of collections at 7 (30%) of the universities responding, but only 4 (17%) are truly glaciological. Most common (4) is rocks, which are hardly glaciological. Oceanic cores and extensive air photos are mentioned by 2. Only 1 has ice cores (Michigan); one has Antarctic water (Cal. Tech.); and one (Ohio State) has original IGY-I.G.C. pit data. By all means, the best photographic and map record is at the American Geographical Society, not a university.

Part III. Curriculum

1. Eight courses suggested as largely "polar" and "glaciology" are given at 7 universities. Four are labelled "glacial geology" and are said to include several weeks of glaciology. One at Stanford is "permafrost" and might better be classified as geology. The only one called glaciology is at Cal. Tech., but details were not given. Altogether, over 54 graduate students and 63 undergraduates are involved (Cal. Tech. unknown), with the biggest group

(40) at Minnesota. (These figures include both graduate and undergraduate students.)

Most of these courses are given once a year, but 2 at Denver (advance geography and Seminar problems) are given "on demand, about every third year." Once again, there is very little offered; and this seems to be buried in glacial geology.

2. There are 19 of 23 returns which indicate no new polar/glaciology courses contemplated in the future. The 4 (17%) which do have plans contemplate work on graduate level occasionally in "physical glaciology," or "polar seminar," or "glacial geomorphology." This will not develop significant instruction over the country; but, as Columbia remarks, "We believe in giving the basic courses and giving training in research." How much is needed?

3. During the last 5 year, 19 graduate degrees were awarded on polar-glaciological theses: 12 M.Sc.'s and 7 Ph.D.'s. There may be a very few more in universities other than the 22 respondents. Ohio State produced the most (7 M.Sc.'s, 1 Ph.D.), and Univ. Washington and Cal. Tech. each produced 2 Ph.D.'s. At Ohio State, only 1 of these men is engaged in glaciological research today.

4. The current trainees number 17 at 8 universities. Ohio State tops the list with 3 Ph.D.'s and 2 M.Sc.'s; Michigan has 3 Ph.D.'s coming along; and Washington U. has 2 M.Sc.'s and 1 Ph.D.

5. Where do these men get glaciological experience? As expected, 10 men (at least) gained from I.G.Y. explorations, and 9 more were aided by other government operations. Only 5 worked on private expeditions and 1 indicated ski troop experience. Only 6 universities (26%) indicated no source of training assistance.

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Part VI. Research

1. Nine of the 23 universities (39%) list 17 current projects in glaciological work. Actually, 2 known to this author are omitted; and 6 are not separate glaciology (2 on ocean bottom cores, 1 in geophysics, 1 in permafrost, 2 duplicated at other universities), so there are actually 13 good glaciological projects. Six of these (46%) involve Antarctic work, 4 are Arctic, and one is in the Rockies. Five are sponsored in part or completely by N.S.F., 3 by S.I.P.R.E., and 2 by universities. They last just over 2 years (average), and $303,235.00 accounts for about half of these projects.

2. For the five-year period just passed, a smaller number of glaciology projects (9) is listed as completed. These are conducted by 6 universities. Unlike present grants, these were mostly in Greenland (6) and some were in Alaska (2). They were sponsored mostly by S.I.P.R.E. (4) and one each by A.F.C.R.C., O.N.R., A.I.N.A., and U.S.A. Transportation Corps. These averaged just under 2 years, and the few listed costs ($113,955.00) represent a small fraction of the total.

3. If one is to gauge from responses alone, there are 8 new proposals from 7 universities (discounting current projects continued) One is strictly geology and another in meterorology, so the true glaciological total is 6. This leaves 12 departments containing experts without specific plans at this time. Very likely, half of these will have made polar plans by the time this report is printed. Of the present proposals, half (3) are Antarctic, and all indicate N.S.F. sponsorship in part, at least. Logistics lie with the Navy in all except one.

4. General comments on the last page of the questionnaire are few and brief. Many are based on the misconception that there are no funds.

Key excerpts:

COLORADO: "lack facilities"
"we don't try to train"

COLUMBIA: "personnel problem eliminated if projects more than one year"
"plane landings and seismic work on Arctic Basin needed"

DENVER: "lack of funds for student research in subglacial geomorph"

FLORIDA: "hampered for lack of funds for grad assistance and summer field work"

MISSOURI: "no funds; no time"

OHIO STATE: "greatest needs are (1) continuity of funds, (2) trained leaders, and (3) improved logistics"

PURDUE: "everything"

STANFORD: "glaciology has been a sideline"

WASHINGTON: "satisfied with SIPRE facilities" but "difficult to find people interested in working on sea ice"

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